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PHILIP P. CALVERT, Ph.D., Editor.
E. T. CRESSON, Jr., Associate Editor.

HENRY SKINNER, M.D., Sc.D., Editor Emeritus.

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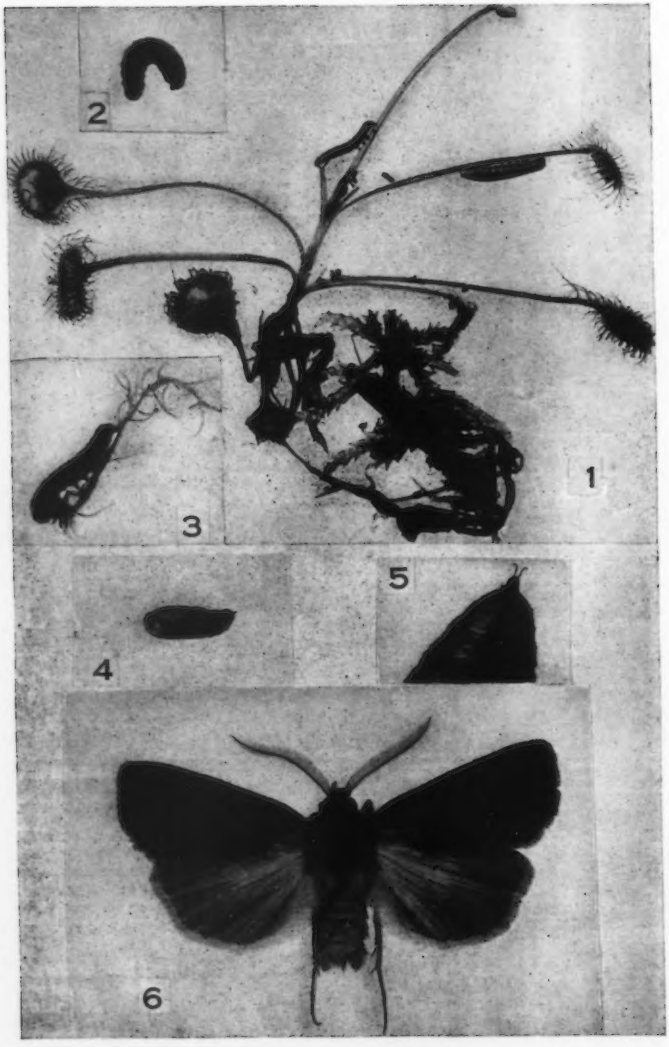

EPIPSILIA MONOCHROMATEA.—HOOKER.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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Notes on the Life History of Epipsilia monochromatea Morr. (Lepid., Noctuidae).[1]

By HENRY D. HOOKER, JR., Ph.D.

(Plate IV.)

In the course of some work on *Drosera rotundifolia* during the summer of 1915, *Drosera* plants collected from Beaver Swamp in the city of New Haven, Connecticut, were found to be attacked by the larva of a noctuid moth, which is as far as I know the only insect that eats with impunity this insectivorous plant.[2] The larvae collected in the early part of July were not more than 3 millimeters long and were readily caught and eaten by the *Drosera* plant when brought in contact with the secreting glands of the tentacles. However, the larva

[1] Contribution from the Osborn Botanical Laboratory, Yale University, New Haven, Connecticut.

[2] H. D. Hooker, Jr., 1916. Physiological observations on Drosera rotundifolia. Bull. Torrey Club 43: pp. 4, 5.

avoids this danger by crawling up the under or abaxial side of the leaf petiole and by attacking the leaf from beneath. When young the larva is pale and feeds on the tips of unfolded leaves and on the central bud. As it grows older it becomes greenish and eats mature leaves, invariably approaching them from the under side. When larvae were placed on the upper or adaxial side of the petiole, they immediately crawled around to the opposite side. This was found to be due to the presence of epidermal hairs on the adaxial surface of the petiole. The abaxial surface of the petiole and the under side of the leaf blade are free from these hairs.

The following summer, 1916, it was accidentally discovered that when the larvae reached a length of about 15 mm. they changed their diet, giving up *Drosera* for the cranberry, *Vaccinium macrocarpon.*

The mature larva is 16 mm. long when extended, 12 mm. long when contracted and 2 mm. thick. It is reddish brown on the back and pale yellow-green toward the front on the ventral surface. There is a well developed white dorsal stripe between two parallel black lines. On either side there are three more dark lines. The head is shiny and very dark honey yellow in color. The true legs are of the same color as the head, but not shiny. There are four pairs of transparent false legs, that are dark at the tip. The anal prolegs are of the same color as the dorsal side.

A single mature larva was obtained, which was taken care of and reared by Dr. W. E. Britton at the Connecticut Agricultural Experiment Station in New Haven. The larva pupated between March 1 and 20. 1917. and a male moth emerged May 8, 1917. It was identified by Dr. William Barnes as *Epipsilia monochromatea* Morr.[3] This form was originally described by Morrison[4] as *Agrotis monochromatea,* and is listed as *Pachnobia monochromatea* Morr. by Dyar[5] and Smith.[6] It

[3] W. Barnes and J. McDunnough, 1917. Check list of the Lepidoptera of North America, No. 1475. Decatur.

[4] H. K. Morrison, 1874. Description of new Noctuidae. Proc. Bos. Soc. Nat. Hist. 17. p. 165.

[5] H. G. Dyar, 1902. A list of North American Lepidoptera, p. 131, Washington.

has been reported from Massachusetts,[7] Durham, New Hampshire,[8] and Canada.[9] The first specimen discovered in Connecticut was collected in New Haven, May 24, 1910, by Mr. B. H. Walden, of the Connecticut Agricultural Experiment Station. This specimen was a female. Subsequently a mature larva was found in some sphagnum collected by Professor G. E. Nichols in Beaver Swamp in April, 1918. Mr. Walden found a pupa in the same swamp April 29, 1918; the adult emerged May 25, 1918. Detailed descriptions of the moth are given by Morrison,[10] Smith[11] and Hampson.[12] Morrison describes the form as follows.

> The expanse of wings measures 32 mm. The male antennae are very strongly bipectinate. The collar, thorax and anterior wings are uniformly reddish brown. All the lines and spots are obsolete, except the two median lines, which are dark, broad, outwardly curved and subparallel. The posterior wings are brownish fuscous, with yellow fringes.

The life history of *Epipsilea monochromatea* may be outlined as follows. The eggs are laid and hatch out in June or July. The young larvae feed on Drosera until August, and then live on cranberry. The mature larvae pass the winter in Sphagnum, pupate in April and the moth emerges in May.

EXPLANATION OF PLATE IV.

Fig. 1. Young larvae feeding on *Drosera rotundifolia*. Photographed by Professor G. E. Nichols. x 1.
Fig. 2. Mature larva contracted. Photographed by Mr. B. H. Walden. x 1.
Fig. 3. Mature larva on Sphagnum. Photographed by Mr. B. H. Walden. x 1.
Fig. 4. Pupa. Photographed by Mr. B. H. Walden. x 1.
Fig. 5. Posterior hooks of pupa. Photographed by Mr. B. H. Walden. x 5.
Fig. 6. Adult ♂. Photographed by Mr. B. H. Walden. x 2.

[6] J. B. Smith, 1893. A catalogue of the species of moths of the Lepidopterous superfamily Noctuidae found in boreal North America, p. 62. Washington.
[7] H. K. Morrison, *loc. cit.*
[8] G. F. Hampson, 1903. Catalogue of the Noctuidae in the collection of the British Museum Vol. IV, p. 483. London.
[9] A specimen was collected by Dr. Fletcher in Canada.
[10] H. K. Morrison, *loc. cit.*
[11] J. B. Smith. 1890 Revision of the species of the genus *Agrotis*. Bull. No. 38 U. S. Nat. Mus. p. 55.
[12] G. F. Hampson, *loc. cit.*

Notes on the Phylogeny of the Orthoptera.*

By G. C. Crampton, Ph.D.

(Continued from page 48.)

Structures which are of but little importance to the life of the organism, are not greatly affected by natural selection (or by use and disuse, if these are factors in evolution) and are among the least-varying structures within an order or superorder of insects. It is just these structures, however, which are of the utmost phylogenetic importance, since their retention is almost wholly due to heredity alone, and on this account I would lay much greater stress upon the evidence afforded by such structures than upon those which are of greater value in the struggle for existence (and hence subject to its modifications), yet vary a great deal even within the same order of insects. Such structures which furnish very serviceable clews as to the interrelationships of the orders of insects are the cervical sclerites or neck plates, which are remarkably constant within an order, or even superorder of insects, and I have therefore laid greater stress upon the character of the cervical and prothoracic sclerites than upon any other one set of structures, although unless supported by the evidence drawn from many other sources as well, the evidence afforded by these structures alone would be wholly inadequate—as is true of any one set of structures taken alone.

In Vol. 28 (p. 393) of Ent. News for 1917, it was shown that the lateral neck and prothoracic sclerites of *Grylloblatta* are astonishingly like those of the Embiids, even in regard to the minutest details—and the resemblance cannot therefore be attributed to a mere convergence (parallelism) in development. Such a resemblance in these unimportant and little-varying structures can only mean that these types of sclerites were inherited from a common ancestry. While the antennae may vary considerably within an order, or even family of insects, the remarkable resemblance (even in the matter of the relative lengths of the segments, etc.) between the antennae

* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

of *Grylloblatta* and *Embia major* Imms adds further support to the contention that the Grylloblattids are quite closely related to the Embiids, as was pointed out in the June, 1917, issue of The Canadian Entomologist (page 213).

In Ent. News, Vol. 26, page 337, attention was called to the resemblance of the tergal thoracic plates of *Grylloblatta* to those of the Dermapterous representatives of the superorder to which the Embiids also belong, and the lateral thoracic sclerites of the Grylloblattids are very like those of the Embiids, although it must be admitted that the lateral thoracic sclerites of *Grylloblatta* are also quite like those of the Isoptera, and the ventral thoracic plates resemble those of the Zoraptera and Mantids as much as those of any other insects.

The legs of *Grylloblatta* are quite like those of the Blattids (and Zoraptera); but I fail to find any other marked Blattid features in the Grylloblattids—although the investigations of Dr. Walker (who is at present working upon the anatomical details of the recently discovered males of *Grylloblatta*) may bring to light other Blattid-like characters in the Grylloblattids. The cerci of *Grylloblatta* are very like those of certain Plecoptera in regard to the relative lengths of the component segments, etc., as was pointed out in a paper published in Vol. 25 of the Journal of the New York Ent. Society (page 225), and I also find a marked resemblance between the cerci of *Grylloblatta* and those of the immature Dermaptera, such as "*Dyscritina*" *longisetosa, Diplatys, Karschiella* and other earwings in which the forceps of the adult are preceded by segmented cerci in the nymphal stages. On the other hand, the cerci of *Grylloblatta* also resemble those of the Mantids to some extent. The ovipositor of *Grylloblatta* could easily be derived from the type found in certain Dermaptera such as *Echinosoma;* but on the whole, the ovipositor of *Grylloblatta* is more like that of certain Mantidae.

From the foregoing discussion, it is evident that *Grylloblatta* resembles the Panplecoptera in regard to the least-varying structures, while in regard to its body as a whole (with the exception of the body contour and its slender nature in which it

is strongly similar to the Embiids and Dermaptera) the resemblances are fairly evenly divided between the Panplecoptera and the Pandictyoptera. *Grylloblatta* has many features in common with the Embiids, Dermaptera, Isoptera, Zoraptera and Mantids, and fewer in common with the Blattids and Plecoptera, so that the choice which we make as to what forms more nearly represent the ancestors of the Grylloblattids depends upon what structures we consider the most important for a phylogenetic study. From my own studies of a rather wide range of anatomical structures, I would be more inclined to regard the neck and prothoracic sclerites as the most dependable features, and taking the evidence as a whole, I have become convinced that Grylloblattids arose from a Plecopteroid stock* (Panplecoptera) rather than from a Blattoid stock (Panisoptera), although it is quite evident that the Grylloblattids branched off from the Plecopteroid stock very near the point at which the Blattoid lines of development likewise branched off from the same Plecopteroid stock, as indicated in the diagram (page 43).

While much attention has been paid to *Grylloblatta* as the most primitive representative of the Orthopteroid group, it must be borne in mind that all of the evidence of relationship must be considered from every available source, and in this connection it would be a very grave error to slight the evidences of relationship presented by that other very primitive Orthopteroid insect *Timema californica* Scud., (a small wingless Phasmid), since *Timema* has preserved certain features which even *Grylloblatta* has lost. *Timema,* like *Grylloblatta,* is wingless in both sexes, and anyone who will compare *Timema* and *Grylloblatta* with the wingless females of the Embiids or Dermaptera will certainly concede that the general appearance of the body is very much more similar in these insects than is the case when one compares the Grylloblattids with the average wingless Blattid or Mantid (or even with the Isoptera, for that matter). Again, while the tarsi of *Grylloblatta* are five-jointed and the legs are quite like those of the Blattids, the

*See footnote, page 48.

tarsi of *Timema,* on the other hand, are but three-jointed, and the legs are extremely similar to those of the Plecopteroid insects, so that in this respect *Timema* is as strongly Plecopteroid as *Grylloblatta* is Blattoid! The head and its appendages in *Timema* are more like these structures in the Plecopteroid insects, as is markedly true of the neck and prothoracic sclerites. I find a strong suggestion of the pronouncedly demarked intersegmental region in front of both the meso- and metathorax in *Timema,* and since to my knowledge, this condition occurs elsewhere only in such Plecopteroid insects as the Embiids and Plecoptera, I think that it is a very important feature in determining the ultimate affinities of *Timema!* The terminal abdominal structures (exclusive of the rather aberrant genitalia of the male) of *Timema* are strongly suggestive of Dermapteron affinities—such for example as the flattened cerci composed of a single segment and bearing mesal prong-like projections, the projecting epiproct (eleventh tergite) and the dorso-ventrally flattened paraprocts (or plates on either side of the anus) which are quite similar in both Dermaptera and *Timema* as may be readily seen by comparing the figures of these structures shown in a paper published in Vol. 13 (page 49) of the Bulletin of the Brooklyn Ent. Soc. for June, 1918. Although the ovipositor of *Timema* is more like that of the Blattids and Mantids, it could have been derived from the type of ovipositor present in such Dermaptera as *Echinosoma* as well, so that the fact that most of the Panplecoptera have not developed (or preserved) an ovipositor would not stand in the way of deriving the Orthopteroid insects from ancestors resembling the Panplecoptera, since some Panplecoptera, at least (*Echinosoma,* etc.), have an ovipositor—and then, too, all of the Orthopteroid insects have not preserved an ovipositor either, since the Gryllotalpids, for example, have none.

From the foregoing discussion, it is apparent that *Timema* is much more like the members of the group Panplecoptera (and the Dermaptera in particular) than it is like the members of the group Pandictyoptera. That I am not alone in this view is evident from the following passage from Mr.

Caudell's paper on the North American Phasmidae (Proc. U. S. Nat. Museum, Vol. 26, p. 884) in which he says "This species (*Timema californica*) apparently represents a step in the transition from the Phasmidae to the Forficulidae. The forcipal cerci of the males, ventrally attached legs, short, broad head, and especially the short, stout legs with the three-jointed tarsi, indicate a relation to the earwigs. As Phasmids these creatures are certainly anomalies, having in one instance at least, been mistaken for a species of Perlid larvae." Handlirsch himself must have been struck with the resemblance of the Orthopteroid insects to the Dermaptera, since he attempts to derive the latter insects from the former, although it is astonishing that he should seek to reverse the evolutionary sequence and derive the Dermaptera from the *Gryllidae*—which is just about on a par with the recent sensational attempt of an English writer to prove that apes are descended from men! The only reason Handlirsch gives for thus arbitrarily discarding all of the evidence of comparative anatomy, embryology, etc., which clearly show that the Dermaptera are more primitive than, and are doubtless "ancestral" to* the Orthoptera in question, is that the known fossil remains of these Orthoptera geologically antedate those of the fossil Dermaptera thus far discovered. Handlirsch makes no allowance for the fact that when the geological formations have been more thoroughly explored it will undoubtedly be found that Dermapterous insects occur in these earlier strata also, and it is this calmly ignoring the evidence of comparative anatomy and embryology that has led him into all sorts of absurdities, such as attempting to derive the winged insects directly from Trilobites (which are not even in the direct line of descent of the Insecta) without reference to the anatomically primitive Apterygota (such as the Protura, etc.), which he is inclined to regard as degenerate winged insects! It may be an indication of the trend

*In stating that the Dermaptera are "ancestral to" the Orthoptera in question, it is merely meant that they have departed but little from the condition which was probably characteristic of the ancestors of the Orthoptera in question.

of the times that so many of our most learned physicists, psychologists, and others, have accepted with blind faith, the revelations of the spiritualist "mediums," but I must confess that I am still old-fashioned enough to be astonished at the ready acceptance that even the most revolutionary ideas of Handlirsch have met with at the hands of such eminent geologists and paleontologists as Schuchert, Lull and others who seem to see nothing at all remarkable in the view that winged insects were derived directly from Trilobites!

When it comes to the discussion of the lines of descent of the saltatorial Orthoptera, however, I would more nearly agree with Handlirsch in his conception of the interrelationships of these insects. The Gryllidae (with the Gryllotalpids, etc.), are undoubtedly very closely related to the Tettigoniidae (formerly called "Locustidae") and their allies, while the Tridactylidae seem to be quite closely related to the so-called Acrididae and their allies. In certain respects, the Tridactylidae occupy a position intermediate between the Acrididae and the Gryllidae, but their line of descent parallels that of the Acrididae quite closely. I formerly proposed that the Acrididae (and Tridactylidae) with their allies constitute an order of insects distinct from that composed of the Locustidae and Gryllidae with their allies; but this is largely a matter of individual opinion depending upon the value one places upon structural differences.

With regard to the relationship of the saltatorial Orthopteroid insects to their more primitive allies, it would appear that such primitive "Locustoid" insects as *Phasmodes* are very like *Grylloblatta* in many respects, and their line of descent has been represented as though quite near that of the Grylloblattids in the diagram. I find many evidences of a rather close relationship between the Oecanthidae and the Grylloblattidae, however, and it is very difficult to determine from the evidence available whether the Grylloblattidae are more closely related to the "Locustidae" or to the Gryllidae. Dr. Walker has contended that the Grylloblattids and Locustids are the more closely related, and a further study of the more primi-

tive "Locustids" may indicate that his view is the correct one; but, since the Gryllid and "Locustid" lines of descent very quickly merge in a common ancestry, in tracing them back to the common stem forms from which the saltatorial Orthoptera arose, it is rather difficult to say which of the two lines is the more closely related to *Grylloblatta*, and until all of the available evidence has been brought forward, it is preferable to suspend judgment in the matter.

I have maintained that the line of development of the Acrididae is closer than that of the Locustid-gryllid group to the Phasmid line of development (of which the Phylliidae are an offshoot), and the recent work of Turner, 1916, on the breeding habits of the Orthoptera (Vol. 9, page 117, of the Annals of the Ent. Soc. of America) would seem to support this view. Handlirsch considers that the Phasmids are connected by the fossil Chresmodidae with the fossil Elcanid forebears of the Tridactylids; but I do not think that such highly specialized Orthopteroid insects as the Elcanidae and their saltatorial allies can be regarded as ancestral to the much more primitive Phasmid *Timema*, whose structural features clearly point to a Panplecopterous ancestry; and the relationship of the lines of descent of these insects as shown in the diagram is more in harmony with the evidence of comparative anatomy. So far as I can judge from the description of these insects, the fossil Elcanidae, Locustopsidae and Chresmodidae should doubtless be included in the superorder Panorthoptera, of which the Phasmidae, Acrididae, "Locustidae," Gryllidae, Grylloblattidae and their allies, form a part. The Thysanoptera, which Handlirsch would group with these insects, seem to have closer affinities with the insects descended from Psocid-like forebears (superorder Panhomoptera), and the Dermaptera (including the Hemimeridae or "Diploglossata," which are true Dermaptera and are not a distinct branch of the Gryllid stock as Handlirsch seems to think) are undoubtedly more closely related to the other members of the superorder Panplecoptera, instead of being more closely related to the Gryllid stock, as Handlirsch would have us believe.

Since Handlirsch's views are so widely accepted, I would briefly summarize the differences between his grouping and derivation of the different lines of descent of the lower winged insects, and that here proposed. Aside from the great difference between Handlirsch's idea of the direct origin of winged insects from Trilobites (while I would derive winged insects from Apterygota, which, with their relatives the Symphyla, are descended from Crustacea related to *Bathynella* and the Isopoda) the principal points wherein the method of grouping and deriving the lines of descent of the lower winged insects as here proposed, differs from that of Handlirsch as given in his book "Die Fossilen Insekten," may be stated as follows. I would gather the Plecoptera, Embiids, Dermaptera, and their allies in an ancestral group, instead of scattering them, as Handlirsch does in his diagram. Handlirsch regards the Dermaptera as an offshoot of the saltatorial Orthoptera instead of placing them in the ancestral superorder Panplecoptera as is here proposed, and he also represents the Diploglossata (Hemimeridae) as a distinct offshoot of the saltatorial Orthoptera, while in reality the Hemimeridae are Dermaptera and should be grouped with them in the superorder Panplecoptera. Handlirsch regards the Phasmids as an offshoot of the saltatorial Orthoptera, while I regard them as nearer the ancestors of these Orthoptera, and I would derive the whole Orthopteroid stock from Panplecopterous forebears—although this Orthopteroid stock branched off very near the point of origin of the Blattoid stock. Handlirsch regards the Thysanoptera as an offshoot of the saltatorial Orthopteroid stock, related to the Dermaptera, while I place the Thysanoptera together with the Corrodentia, Mallophaga and Pediculidae (all of which Handlirsch derives from the Blattidae) in a superorder with the Hemiptera (i. e. in the superorder Panhomoptera), and I consider that this superorder arose at the base of the Neuropteroid group, to which all of them are very closely related. They, with the Neuropteroids, are descended from Plecopteroid (not Blattoid) forebears, and the Hymenoptera arose from the base of the Neuropteroid stock also, and are therefore to be traced

back to Plecopteroid forebears rather than to Mantoid ancestors as Handlirsch considers to be the case. I place the Coleoptera in the group Panplecoptera, next to the Dermapteron line of descent, thus differing from Handlirsch who would derive the Coleoptera from the Protoblattoidea. There are many other points of difference, especially in the grouping and derivation of the higher insects; but these will be taken up under the discussion of the phylogeny of the other groups of insects, in a series of papers dealing with each group in detail.

Odonata Anisoptera from Guatemala

Collected by Messrs. William Schaus and John T. Barnes.

By PHILIP P. CALVERT, University of Pennsylvania, Philadelphia, Pa.

(Continued from page 38.)

LIBELLULINAE.

Libellula foliata (Kirby). Purulhá, 5500 feet, June 30, 1 ♂, "body orange brown, costal margins orange," 1 ♀, swampy road. Guatemala City, July 1, 1 ♂.

These three specimens are younger than those described in the Biologia volume and by Ris, in the Cat. Coll. Zool. Selys, the males having the frons and vertex pale ochre, the female pale greenish brown, both sexes with the labrum orange yellow. In the male from Guatemala City the genital lobe has a posterior process or lobe similar to that figured for *Brechmorhoga postlobata* (Proc. California Acad. Sci. 3d Ser. Zool. I, pl. xxv) but even more distinctly developed. I find no other differentials correlated with the presence of this process so, in spite of the precedent set by naming this *Brechmorhoga*, do not consider this male worthy of a separate name, at least until additional similar specimens come to hand.

Libellula herculea Karsch. Chejel, 3100 feet, June 26, 1 ♂, "at same place as spec. 1. Thorax laterally and below whitish lilacine. Abdomen above deep crimson."

Pseudoleon superbus (Hagen). Zacapa, June 30, 1 ♂. Sanarate, November 21, 1 ♂, 1 ♀. Escuintla, railway track, July 7, 1 ♀.

Uracis imbuta (Burmeister). Cayuga, forest, May 27, "very dry just now," 1 ♀; edge of forest near half dried stream, May 28, 1 pruinose ♂, "head and body grey-blue"; forest, November 19, 1917, 1 ♀. Quirigua, 500 feet, pine woods, February 17, 1 ♀; February 18, 1 ♂; February 24, 1 ♂; forest, March, 3 ♀. Escuintla, April, 1 ♀.

Uracis fastigiata (Burmeister). Escuintla, May, 1917, 1 ♂.

Tholymis citrina Hagen. Cayuga, January 25, 1916, dusk, 1 ♀, "flew into house"; September 2, 1917, veranda, 1 ♀.

Micrathyria didyma didyma (Selys) Ris. Cayuga, forest: June 10, 1 ♀; August 25, 1 ♂, 1 ♀; September 4, 1 ♂.

Micrathyria aequalis (Hagen). Cayuga, August 25, 1 ♀ on veranda.

Orthemis ferruginea (Fabricius). Cayuga, at light: March 7, 1 teneral ♀; April 3, 1 teneral ♀; August 12, 1 ♂ (adult); September 20, 1 ♂, "abdomen purple."

Cannaphila insularis funerea (Carpenter) Ris. Cayuga, April 20, 1 teneral ♂ *a*, 2 ♂ *b*; Cayuga, Rio Negro trail, forest, April 30, 2 ♂ *a*; trail behind Cayuga, forest ridge, dry, May 17, 1915, 1 ♂, 1 ♀ *b*; Cayuga, forest, May 27, 1 ♀ *b*, "abdomen above golden brown with black segmental lines"; June 5, 1 ♂ *b*; in forest, June 20, 1 ♀ *a*, "body fuscous; pale dorsal yellowish line interrupted segmentally; a similar short lateral streak at base of abdomen; oblique pale greenish streaks on thorax." Escuintla, July 7, 1 ♀ *b*.

This is the *Cannaphila angustipennis* (Rambur) of the Biologia volume, page 241, a name which Dr. Ris has shown to be untenable on account of the priority of *angustipennis* Stephens, a homonym. The letters *a* and *b* are employed in the above list of specimens as in the *Biologia* to indicate specimens with entirely yellow labium (*a*) or with the labium more or less marked with black (*b*). It would seem that this difference in labial coloring has no geographical, seasonal or ontogenetic significance.

Cannaphila vibex (Hagen). Tactic, July 30, 1 ♂. Escuintla, May, 1917, 1 ♀.

Anatya normalis Calvert. Cayuga, April 21, 1 ♂; forest, August 31, 1 ♂, 1 ♀, both teneral; September, 1 ♂.

Erythrodiplax funerea (Hagen). Gualan, August, 1 ♂. Caballo Blanco, August, 1 teneral ♂. Polochic River, July 25, 1 ♂. Purulhá, October, 1 ♀. Iguana, open marsh country, August 24, 1 adult ♂.

Erythrodiplax umbrata (Linnaeus). Iguana, open marsh, August 24, 1 ♂. Quirigua, February 8, 1 teneral ♂; open country, March 3, 1 ♂ not fully colored, the dark band on the wings smoky brown instead of pale ochraceous, ill-defined, much narrower at the hind margin than at the costa.

Erythrodiplax ochracea ochracea (Burmeister) Ris. Cayuga: forest, March 29, 1 teneral ♂; April, 1 ♂; May 19, 1 ♂; near stream in bananas, May 28, 1 ♂, "thorax black; abdomen reddish purple; base of wings rich brown"; 1 ♀, "thorax greenish yellow shaded with brown above, abdomen black with yellowish streaks on each segment; base of wings orange brown"; August, 1917, 1 teneral ♂. Quirigua, 1 teneral ♂.

Erythrodiplax connata fusca (Rambur) Ris. Cayuga, May 1, 1916, 1 ♀, "at light, 2 a. m., quiet night," abd. 16, hind wing 20, pter. f. w. 2.5 mm.; stream in bananas, May 28, 1 ♂, "thorax, base of abdomen and base of wings dark brown, abdomen lilacine, terminally black," abd. 20, hind wing 22.5, pter. f. w. 3.5 mm., the brown at base of hind wings not quite attaining triangle; October 27, 1 ♀, 16, 20 and 2.5 mm.; bananas, October 29, 1 teneral ♂, 17, 22, 2.5 mm., 1 ♂, 16, 20, 2.5 mm. Montufar, November, 1917, 1 ♂, 16, 20, 2.5 mm. Iguana, open marsh, August 24, 3 ♂, 16.5-18, 19.5-22, 2.5-3 mm. All of these specimens fall under the section *Erythrodiplax connata, e,* Biologia, pages 259, 261. The measurements and other data here given may aid in the ultimate elucidation of this variable species.

Dythemis velox Hagen. Cayuga, forest, September 4, 1 ♂. Gualan, August, 1 ♂. Joaquina, April 28, 1 ♀.

Brechmorhoga vivax Calvert. Chejel, June. 2 ♂, one having in the posttriangular field, hind wings, three single cells, then two rows, hence as in *B. nubecula.*

Brechmorhoga praecox praecox (Hagen) Ris. Escuintla, forest stream, July 12, 1 ♂.

Brechmorhoga pertinax pertinax (Hagen) Ris. Purulhá, June 27, 1 ♂; forest stream, July 7, 1 ♀. This is *B. pertinax, a,* of the Biologia, page 284.

Brechmorhoga rapax crocosema Ris. Chejel, June 18, 1 ♀. "markings greenish blue, spot on abdomen orange;" June 17, 1 ♂; August, 1 ♀. This is the Guatemalan-Costa Rica form of *rapax* of the Biologia, page 285, not of the original type form of *rapax* which is Venezuelan.

Brechmorhoga inequiunguis (Calvert). Escuintla, July 6, 1 ♀.

Dr. Ris (Cat. Coll. Zool. Selys, fasc. ix, p. 34, 1909; fasc. xv, pp. 868, 870, 1913), defining the genera on a somewhat different basis, has referred this species to *Macrothemis,* as I

originally did, and placed it as a subspecies of *M. tessellata* (Burm.). I have not restudied the questions involved.

Macrothemis pseudimitans Calvert. Escuintla, July 6, 1 ♂; track, August 8. 1 ♂, "eyes, shoulders and dorsum lilac."

Macrothemis hemichlora (Burmeister). Quirigua, March, 1 ♂, 1 ♀, the latter "railway track." Caballo Blanco, August, 1 ♀. Mazatenango, November 30, 1 ♀.

Macrothemis inacuta Calvert. Zacapa, June 30, 1 ♂, 1 ♀; July 26, 1 ♂.

Tramea cophysa Hagen. Cayuga, at light: September 10, 1 ♀; October 11, 1 ♂; November 15, 1917, 1 ♀. The October male is of the *"longicauda,* var?" of the Biologia, page 303, which, following Dr. Ris, I place here.

Perithemis domitia (Drury). In listing this material I have followed the order of the Biologia volume and have given data on the individual specimens, believing such will be useful in later studies of this protean species.

P. domitia form **domitia** (Drury) ? Cayuga, February 2, 1918, 1 ♂; front wings, internal triangle 2-(right) or 3-(left) celled, three posttriangular rows begin at the level of separation of R*s* from M1+3; all wings uncolored from base to nodus posterior to subcostal space, yellow for whole width from nodus to apex and in subcostal space from base to nodus. Cayuga, Rio Negro trail, forest, April 30, 1 ♀; front wings, internal triangle 2-(left), 3-(right) celled, discoidal triangle 2-celled (right), free (left), three posttriangular rows begin at the level of separation of R*s* from M1+3; discoidal triangles, hind wings, free; all wings orange from base to apex for entire width, a little paler toward hind margin on front wings.

P. domitia form **iris** (Hagen), **i.** 4 ♂ unlabeled as to locality or date.

P. domitia form **iris** (Hagen), **ii.** Gualan, November 4, 3 ♂. 1 of them with discoidal triangle 2-celled, all wings, internal triangle free (right), 2-celled (left).

P. domitia form **iris** (Hagen), **ii** or **iii.** Cayuga, bananas, October 29, 1 ♂.

P. domitia form **mooma** (Kirby). Cayuga: open hill top, June 4, 1 ♂; August, 1 ♀; September 27, close to house, 1 ♀; October 23, house, 1 ♀. Caballo Blanco, August, 1 ♀. The male, of course, might equally well be referred to form *iris,* iii.

Rhodopygia hinei Calvert. Oneida, March 1, 1917, 1 ♀.

The female of this species has not been described, wherefore the following:

Vertex and frons ochre brown, clypeus and occiput paler, more yellowish. Lips yellow, a tendency toward orange in the free margin of the labrum. Rear of the head and bases of the mandibles pale greenish.

Prothorax obscure yellowish, inclining toward ochre in the middle lobe. Thorax brownish yellow, darker on the mesepisterna, which in addition to the long hairs bear numerous closely-set brown spinules.

Abdomen brownish yellow, perhaps even golden yellow in life, more robust than in *R. hollandi* ♀, the only species of this genus of which a female is available for comparison, compressed and evidently partly distorted. Vulvar lamina reaching to one-fifth the length of the lateral margin of 9, flattened on to the sternum thereof so that it is impossible to state its angle of projection, bilobed in its distal half by a semicircular emargination whose width is a little greater than its depth and is subequal to one-fourth of the basal width of the whole lamina. Appendages concolorous, longer than 10, a little shorter than 9, rather stout, very acute at apex.

Legs brownish yellow becoming darker distally on the tibiae and tarsi, the third tarsal joint almost black; spines on the legs black.

Wings hyaline, front wings very pale yellow at base, almost impossible to say where this color ceases but hardly visible distad of the level of the arculus; hind wings a slightly deeper yellow at base, also gradually fading out at the level of the triangle and at about two cells posterior to the level of the hind end of the ash-colored membranule. Stigma pale brownish yellow. Front wings with 19 antenodals, 13R, 14L postnodals, 2 rows of cells between Rs—Rspl a maximum of 3 rows in the anal field proximal to the triangle. Hind wings with 14R, 15L antenodals, 15 postnodals, 1 row (with 1 double cell) R, 2 rows L between Rs—Rspl, 4-3 rows between A3 and the hind margin at the level of the triangle.

Abdomen 33, hind wing 43.5, costal edge of stigma of front wing 4.5 mm.

I refer this individual to *hinei* because of its robust abdomen and the presence, in three of the four wings, of two rows of cells between the subnodal sector (Rs) and the supplementary sector next below (Rspl).

In this connection, I may remark that the size of the pterostigma and very venational characters which Dr. Ris has commented on in his descriptions of *R. hollandi* and *R. chloris* (Cat. Coll. Zool. Selys, Libell. fasc. xiii, pp. 610-612, 1911) lead me to think that it is his *chloris* which is the same form as that which I described previously as *hollandi*, and that

his *hollandi* requires a new name. As far as I can judge the anterior lamina of the true *hollandi* and of *chloris* is less prominent than in his *hollandi*. "*Dunkel* braun" is rather too dark for the basal spot of the hind wing of true *hollandi*.

Having written Dr. Ris to this effect, he has replied (15, ix, 1918):

"*Rhodopygia hollandi* as described by myself from Surinam shows evidently some slight differences from your type of Matto Grosso. Besides the specimens recorded in the main text of Lib. [*i. e.* Cat. Coll. Selys *cit.*] there are three more mentioned in the appendix from the Williamson collection. No doubt Mr. Williamson will send you his specimens for inspection. From these my *Rh. chloris* is evidently different and seems more closely allied to *cardinalis* than to them."

Mr. Williamson has kindly lent me two males from British Guiana, Tumatumari and Georgetown, respectively, both bearing Dr. Ris' own identification label "Rhodopygia Hollandi." An examination of them does not incline me to change my opinion as to their difference from the typical *hollandi* as expressed above. On comparing them with two paratypes of *hollandi* Calvert (Demerara 1 ♂, Cuyaba 1 ♂), now in the Academy of Natural Sciences of Philadelphia, I find that they have

One row of cells between *Rs* (subnodal sector Selys) and *Rspl* (supplementary sector next below) on all the wings (two rows in true *hollandi*); costal edge of the stigma, front wings, 3.25-3.5 mm. (4 mm. in true *hollandi*); the apex or posterior angle of the external branch of the hamule less acute than in typical *hollandi*, when the hamule is viewed in profile so that both external and internal branches are visible at once (as in fig. 54, pl. IX, Biol. C. A. Neur., which does not exaggerate the acuteness of this apex); first femur blackish anteriorly for the whole length (reddish brown in typical *hollandi*), first tibia blackish both above and below (pale reddish or pale reddish yellow in typical *hollandi*), second legs blackish on femur and tibia near their articulation (not so in typical *hollandi*); coloring at the bases of the front and hind wings a darker brown, but of the same extent as in typical *hollandi*. Abd. 32, hind wing 35-36 mm.

Whether *hollandi* Ris varies into *hollandi* Calvert can only be determined by fuller series of specimens.

Sympetrum illotum virgula (Selys). Volcan Santa Maria: October 22, 1 ♂, "abdomen crimson;" October 31, 1 ♂ and 1 pair "in cop."

(5500 feet); November 1, 1 ♀. Antigua, 5500 feet, November 24, 1 ♂. In none of these males does the yellow of the front wings extend continuously to the nodus where each, however, has a small yellow cloud; the blackish basal streak in the subcostal space of the hind wings reaches to the level of the arculus in those of October 22 and November 24; in the other two and in the two females it stops at the first antenodal or but slightly distad. The female of October 31 has the basal yellow confined to a very narrow border around the blackish basal streaks and a mere trace of yellow at the nodus, in that of November 1 the yellow in the subcostal space fades out just beyond the level of the triangle, but the nodal cloud is distinct.

Erythemis attala (Selys). Cayuga, edge of forest in bananas, June 20, 1 ♂, "body brown black, 4 large paired yellow spots on abdomen dorsally." Quirigua, forest, September 16, 1 ♀.

Lepthemis vesiculosa (Fabricius). Cayuga, August, 1 ♂, "emerald green and black."

Remarks on the Species assigned to Cavotettix Hancock, a Synonym of Neotettix Hancock (Orthoptera, Acrididae, Acrydiinae.)

By MORGAN HEBARD, Philadelphia, Pa.

In the month of November, 1918, there appeared a paper by Dr. J. L. Hancock in the ENTOMOLOGICAL NEWS, in which a new genus and two new species were described. As one of the species described by Rehn and Hebard in 1916, as a member of the genus *Neotettix*, was assigned to this new genus, the author's interest was at once aroused as to the reason for such generic reassignment.

In order to weigh carefully the features in the problem to be considered, the very large series of *Neotettix femoratus* (Scudder) and *Neotettix bolteri* Hancock, in the Philadelphia collections, have been examined and compared with the material at hand referable to the species assigned to *Cavotettix* by Hancock. From these studies we are satisfied that *Cavotettix* Hancock must fall as a synonym of *Neotettix* Hancock.

Taking Hancock's description of *Cavotettix*, we find that the majority of the features, given as diagnostic for that genus, are those resultant from the retention of an immature pronotal

type in the adult condition. These are: "the body apterous or subapterous.....the tectate dorsum, with the median carina of the pronotum, compressed-cristate..... the broad scapular area at the sides of the pronotum; the lateral lobes of the pronotum bearing but one deep and angular excavate sinus, the superior tegminal sinus being vestigial or entirely obliterated; the tegmina either absent or rudimentary, normally covered from view." These are of no more generic value than similar features shown by species of the genus *Acrydium*, showing the retention of an immature pronotal type in the adult condition.[1]

The remaining characters given for *Cavotettix* are:

"The median carina of the vertex more compressed." This is correct for the species there included. It is in itself insufficient for generic separation.

"The somewhat wider scutellate frontal costa." This is invalid as a generic feature. In *N. bolteri* the frontal costa has been found to vary from the narrower type found in the genotype, *N. femoratus*, to a condition fully as wide as found in the species assigned by Hancock to *Cavotettix*.

"The first joint of the hind tarsi nearly twice the length of the second and third combined." This is a specific but not a generic feature, as the difference between the species discussed and *femoratus* and *bolteri* is not as decided as might at first be supposed, when the moderate amount of individual variability in this feature is noted.

Neotettix proavus Rehn and Hebard.

1916. *Neotettix proavus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, p. 139. [♂, ♀: Murphy, North Carolina; Macon, Buckhead and Jasper, Georgia.]

1918. *Cavotettix apterus* Hancock, Ent. News, XXIX, p. 345. [♂, ♀: Clarksville, Tennessee.]

1918. *Neotettix proavus* Fox, Ent. News, XXIX, p. 347. (Description of caudate phase.) [♀: Clarksville, Tennessee.]

After careful examination and comparison of a considerable

[1] In reference to this remarkable feature, Rehn and Hebard have stated: "That this condition is deep seated in the subfamily is quite apparent, and it is equally evident that it is characteristic of certain species and again occurs as a variant in species normally of the usual type." Proc. Acad. Nat. Sci. Phila., 1916, p. 138, (1916).

series from Clarksville, Tennessee, with the type of *proavus* and other specimens of this species, we unhesitatingly assign *Cavotettix apterus* Hancock to the present synonymy.[2]

In considering the characters given by Hancock as diagnostic for *apterus*, we find them attributable wholly to individual variation, excepting the presence or absence of tegmina and wings. From examination of the series it is ascertained that in this species greatly atrophied tegmina and much reduced wings are present in all, but apparent only in occasional examples.[3]

Measurements (in millimeters)

	Length of body[4]	Length of pronotum	Width of pronotum	Length of caudal femur	Width of caudal femur
♂					
Jasper, Ga.	8.5	7.1	2.25	5.	2.
Macon, Ga. *Allotype*	8.5	7.1	2.45	4.9	1.9
River Junction, Fla.	7.8	7.	2.35	4.9	1.95
Clarksville, Tenn. (20)..	7.5-8.6	7.1-8.1	2.4-2.8	5.3-5.6	2.-2.1
Greenville, Ala.	7.8	7.2	2.3	5.	2.
Evergreen, Ala.	8.3	7.	2.65	5.	2.
♀					
Buckhead, Ga.	9.9	8.3	2.9	5.9	2.15
Macon, Ga. *Type*	10.4	8.8	2.85	5.7	2.1
River Junction, Fla. (2)	9.8-9.9	8.-8.6	2.8-3	5.5-5.8	2.1-2.1
Clarksville, Tenn. (18)..	9.5-10	8.4-9.1	3.-3.15	5.6-6.1	2.1-2.3
Clarksville, Tenn.[5] (2) ...	10.8-10	11.-11.3	3.4-3.4	5.8-6	2.15-2.2

[2] We have received full concurrence in this opinion by James A. G. Rehn, Henry Fox and W. S. Blatchley. The pair from which *apterus* was described was given to Blatchley by Fox, who in turn loaned the specimens to Hancock for examination. Though Hancock stated that *apterus* might be only a race or variety of *proavus*, it is clear that he made no real effort to secure further material for comparison, or to determine the actual values of the characters given as of specific diagnostic importance.

[3] Through a desire to damage or distort the male allotype of *proavus* as little as possible, Rehn and Hebard erred in making the statement "Tegmina absent." Examination of this specimen relaxed shows that, as in the other specimens at hand, vestigial tegmina are present though wholly concealed. It is believed that Hancock is similarly incorrect in his statement concerning *apterus* in his key, "Tegmina absent in female," which statement is qualified by "or entirely hidden from view" in his description.

[4] From vertex to apex of abdomen.

[5] Caudate examples.

The great majority of the specimens are brown (maximum recessive, tawny olive), individually varying to blackish brown. The velvety black posthumeral triangles are very conspicuous in the majority, in a few weakly defined. One female from River Junction is decidedly mottled; while the male from that locality and the female type from Macon alone show a very striking bicolored condition, blackish in the cephalic half, paler and decidedly contrasting verona brown caudad of the posthumeral triangles, the external faces of the caudal femora alone blotched with blackish proximo-mesad.

This species has been found by Dr. Henry Fox to be a spring form; the majority of the series assembled by him were taken about the middle of June. This is probably also true for *N. nullisinus* (Hancock). As our field work has been largely undertaken in the late summer and during the fall, the reason why we have not collected much larger series is apparent.

We have given here a reference to the discussion of the recently discovered caudate type of the present species by Dr. Henry Fox. This is a most interesting feature, ably treated by that author.

Specimens Examined: 50; 26 males[6] and 24 females.

Jasper, Georgia, elevation 1550 feet, VIII, 5, 1913, (R.; woodland composed of mixed pine and oak), 1 ♂, *paratype*, [A. N. S. P.]

Buckhead, near Atlanta, Ga., VIII, 2, 1913, (H.; hillside oak forest), 1 ♀, *paratype*, [A. N. S. P.]

Macon, Ga., VII, 30 and 31, 1913, (R. & H.; woodland of short-leaf pines), 1 ♂, 1 ♀, *type, allotype*, [Hebard Cln.].

River Junction, Florida, VIII, 31, 1915, (R. & H.; in damp sandy area of ravine deciduous forest among very scant herbage), 1 ♂, 2 ♀, [Hebard Cln. and A. N. S. P.].

Clarksville, Tennessee, V, 27 to VII, 24, 1917, (H. Fox), 20 ♂, 20 ♀, (2 ♀ caudate), [Fox, A. N. S. P. and Hebard Clns.].

Greenville, Alabama, VIII, 3, 1915, (H.), 1 ♂, [Hebard Cln.].

Evergreen, Ala., VIII, 4, 1915, (H.; in leaf litter on almost bare ground of heavy forest of magnolia, gum and some holly and tulip trees), 1 ♂, [Hebard Cln.].

Neotettix nullisinus (Hancock)

1918. *Cavotettix nullisinus* Hancock, Ent. News, XXIX, p. 344. [♀: Brownsville, Texas.]

The less decidedly tectiform pronotum, with cephalic margin

[6] One male labelled only "Schaum's Collection" is in the Hebard Collection.

of dorsum transverse or very feebly obtuse-angulate produced, and the tegmina which, though reduced, are normally in large part apparent, readily distinguish this interesting species from *N. proavus* Rehn and Hebard.

The previously unknown male of this species is a smaller replica, in all ambisexual features, of the female sex.

Measurements (in millimeters)

	Length of body	Length of pronotum	Width of pronotum	Length of caudal femur	Width of caudal femur
♂					
Houston, Tex.	7.3	7.2	2.3	4.8	2.1
Webster, Tex.	7.4	7.	2.3	4.8	2.2
Webster, Tex.	7.7	7.2	2.35	4.7	2.
Webster, Tex.	7.8	7.	2.35	4.75	2.1
♀					
Houston, Tex.	9.5	8.8	3.	5.7	2.3
Webster, Tex.	9.9	8.8	2.9	5.8	2.3

With the exception of one female, the series is uniform fuscous black in general coloration. The velvety black humeral triangles are weakly indicated in the males, slightly more conspicuous in the females. One female is of the bicolored type which is also found in *proavus;* in this example, the portions cephalad of the posthumeral triangles are blackish brown, those caudad of that point distinctly paler, saccardos umber shading to sepia toward the medio-longitudinal carina on the pronotum.

Specimens Examined: 6; 4 males and 2 females.

Houston, Texas, VIII, 12, 1915, (R. & H.; on ground covered with scant short grass under scattered oaks[7]), 1 ♂, 1 ♀, [Hebard Cln.]

Webster, Harris County, Tex., VII, 19, 1912, (H.), 3 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

An Entomologist's Handbook.

An entomologist's handbook or compendium is very much needed, especially by economic entomologists. It is planned to compile such a handbook, which will include principles and methods of studying the life histories of insects, of conducting field experiments and demonstrations, handy tables for field workers, et cetera. It is desired to have references, or better, to have separates of all published notes dealing directly or indirectly with the subject and to have details, and if possible, drawings or photographs as well, of cages, apparatus, methods, etc., as yet unpublished. The handbook will be a compilation and full credit given to all contributions.

The co-operation of entomologists is solicited.—JOHN J. DAVIS, Box 95, West Lafayette, Indiana.

[7] Long continued search in this area, with a view to securing further specimens of this insect, proved fruitless.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., MARCH, 1919.

The Next International Entomological Congress.

The first International Entomological Congress, held in Brussels, Belgium, in 1910, was an unqualified success, both from the scientific and social standpoints. The exposition being held at the same time and place was an additional interest.

The second Congress was held in Oxford, England, during August, 1912, and was equally enjoyable in every way. A feature of this meeting was the pleasant excursions to places near Oxford and the very profitable and enjoyable day spent at Tring. There was a relatively large attendance of Americans at this meeting, seventeen being present and but three at the first Congress.

The third Congress was to have been held in Vienna, Austria, in 1915, but unforeseen, non-entomological European interests made the meeting difficult, if not impossible, so it was not held.

The termination of the war has led some entomologists to think of the next meeting of this association.

Dr. C. Gordon Hewitt, the Dominion Entomologist, suggests holding the Congress in the United States next year, when traveling conditions become settled. He believes that if the congress were held in one of our large cities the attendance would be a record one.

There is no question but that a meeting on this side of the ocean would greatly increase the membership and would afford much pleasure to the delegates and members from abroad who have not visited America.

They would probably also be glad of the opportunity to study our museums and collections.

It will be interesting to know what American entomologists think of the suggestion to have the meeting on this side.—HENRY SKINNER.

The Jubilee of the Canadian Entomologist.

With the number for December, 1918, *The Canadian Entomologist* completed its fiftieth volume, Volume I, Number 1, bearing the date August 1, 1868. We offer our hearty congratulations to our oldest monthly sister of this continent.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

An Appeal From Belgium.

The following letter has been received from the Curator of the Entomological Section of the Royal Museum of Natural History of Belgium:

[Translation]

Brussels, 11-I-1919.

Dear Sir:

It is absolutely necessary that you write some notices in the American scientific journals in order to save the Selys Catalogue. I have lost twenty subscriptions in Europe and I must retrieve them in the United States. Financial aid from the de Selys family is impossible for a long time. Each new subscription will bring a little capital to the reconstitution of this work which can be brought to a termination with a little energy and with the aid of all. The great institutions, libraries, etc., ought to put some of their pennies into subscriptions.

.....

Here we have suffered much from the slow and inexorable hunger, from the nervous depression of our abominable slavery that no one can describe. Our museum and our collections are saved, but I have lost one of my two sons who was at the front, a fine boy of 24 years, a captain of engineers. I have lost a part of my small fortune and my health, but more I fear that the sufferings from hunger have compromised the future of my younger son and of my grandchildren.

The balance sheet is sad and I have little courage to take it up. I would not, however, see the Catalogue, to which I have devoted myself for years, founder. This is why I call for your aid. Write to your entomological friends and sustain me.

Yours sorrowfully,

G. SEVERIN.

The Baron Edmond de Selys Longchamps (1813-1900) was known as the chief authority on the taxonomy and geographical distribution of the Odonata. He formed an extensive collection of these insects and of other "neuropteroids" from all parts of the world, and of the vertebrates and some other groups of Europe. These collections were presented after his death to the Brussels Museum by his two sons.

The publication of the *Catalogue Systématique et Descriptif des Collections Zoologiques du Baron Edm. de Selys Longchamps*, "designed to realize the supreme desire of their late possessor and at the same time to serve science," was begun in 1906 under the care of the two sons, M. Severin and a number of zoologists, who undertook, as specialists, the preparation of certain parts thereof.

It was planned to appear in 32 fascicules of a varying number of pages, of large quarto size, illustrated by text figures and some plates. The subscription price for the complete work was fixed at 25 centimes (20 centimes for the fascicules on Orthoptera, Lepidoptera and Vertebrates) per page of text, 2.75 francs per colored plate and 2 francs per black and white plate, with an increase of 25 per cent. for subscriptions to separate parts only.

At the beginning of the war 21 fascicules had appeared, treating of the Orthoptera, Embiidae, Perlodides, Megaloptera, Trichoptera, Ascalaphidae, Libellulinae, Cordulinae, Aeschninae, Birds, Mammals, Amphibians and Fishes, at a total price of 703.50 francs. The eight fascicules on the Libellulinae by Dr. F. Ris, of Rheinau, Switzerland, constitute the most extensive monograph on that subfamily ever produced, and several other groups have been dealt with in a similar fashion. Several fascicules are in such an advanced state of preparation or of printing that they can be issued in a short time.

There are many reasons—scientific, humanitarian, international, appreciative of the nation which has suffered so fearfully—why the Selysian Catalogue should be carried to completion, and it is to be hoped that readers of this appeal will personally do all in their power to aid in this accomplishment by inducing institutions which they can influence to subscribe. All correspondence relating to subscriptions should be addressed to M. G. Severin, Musée Royal l'Histoire Naturelle, 31 Rue Vautier, Bruxelles, Belgium.—PHILIP P. CALVERT, University of Pennsylvania.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

4—Canadian Entomologist, London, Can. **5**—Psyche, Cambridge, Mass. **8**—The Entomologist's Monthly Magazine, London. **10**—Proceedings of the Entomological Society of Washington, D. C. **15**—Insecutor Inscitiae Menstruus, Washington. **17**—Lepidoptera,

Boston, Mass. **20**—Bulletin de la Societe Entomologique de France, Paris. **22**—Bulletin of Entomological Research, London. **51**—Archiv fur Mikroskopische Anatomie, Bonn. **58**—New York State Museum Bulletin, Albany. **59**—Journal of Agricultural Research, Washington. **63**—Memorias de la Sociedad Cubana de Historia Natural "Felipe Poey," Habana. **68**—Science, Lancaster, Pa. **77**—Comptes Rendus des Seances de la Societe de Biologie, Paris. **78**—Bulletin Biologuque de la France et de la Belgique, Paris. **79**—Bulletin of the Museum of Comparative Zoology at Harvard College, Cambridge, Mass. **80**—Revue Suisse de Zoologie, Geneve. **81**—The Journal of Parasitology, Urbana, Illinois. **82**—The Ohio Journal of Science, Columbus.

GENERAL. Gautier, C.—Etudes physiologiques et parasitologiques sur les lepidopteres nusisibles. La ponte des Apanteles parasite de Pieris brassicae. **77,** lxxxi, 1152-55. **Howard, L. O.**—Entomology and the War. (Scientific Monthly, Lancaster, viii, 109-17). **Mortensen, T.**—Observations on protective adaptations and habits, mainly in marine animals. (Pub. Univ. Zool. Mus. Kobenhaven, N I., pp. 57-96). **Ramsden, C. T.**—Vida y exploraciones zoologicas del Juan Gundlach en Cuba. **63,** iii, 146-68. **de Sagarra, I.**—Instrucciones por los recollectores d'insectos. (Mus. Barcinonensis Sci. Nat. Opera, Zool., Barcelona, iv, 97 pp.) **Sturtevant, A. H.**—An analysis of the effects of selection. (Carnegie Inst. Wash., Pub. No. 264, 68 pp.) **Weiss, H. B.**—Insects which attract public attention. (Scientific Monthly, Lancaster, viii, 179-86.)

MEDICAL. Sturtevant, A. H.—Flies of the genus Drosophila as possible disease carriers. **81,** v. 84-5.

ARACHNIDA & MYRIAPODA. Carl, J.—Miscellanees diplopodologiques. (Neotropical). **80,** xxvi, 417-68.

Chamberlin, R. V.—New [5] polydesmoid diplopods from Tennessee and Mississippi. **5,** xxv, 122-27.

NEUROPTERA. Banks, N.—Antillean Isoptera. **79.** lxii, 475-89. **Howe, R. H.**—Odonata of the Franconia region, New Hampshire. **4,** 1919, 9-15. **Kennedy, C. H.**—A new sp. of Argia. **4,** 1919, 17-18. **Moore, W.**—The effect of laundering upon lice, (Pediculus corporis) and their eggs. **81,** v, 61-8.

ORTHOPTERA. Chopard, L.—Diagnoses d'Orthopteres nouveaux (Phasgoneuridae) [Neotropical]. **20,** 1918, 243-6. **Du Porte, E. M.**—On the structure and function of the proventriculus of Gryllus pennsylvanicus. **5,** xxv, 117-22. **Pantel & Sinety.**—Reaction chromatique et non chromatique de quelques phasmides aux

excitations dependant de la lumiere. **78,** lii, 177-283. **Piers, H.**—The Orthoptera of Nova Scotia; with descriptions of the species and notes on their occurrence and habits (Proc. & Trans. Nova Scotia, Inst. Sci. xiv, 201-354).

HEMIPTERA. Muir, F.—Notes on the Delphacidae in the British Museum Collection. **4,** 1919, 6-8. **Osborn, H.**—The meadow plant bug, Miris dolabratus. **59,** xv, 175-200. **Wilson, H. F.**—Some new [7] lachnids of the genus Lachniella. **4,** 1919, 18-22 (cont.).

LEPIDOPTERA. French, G. H.—Catocala ulalume vs. C. carolina. **4,** 1919, 16. **Kaye, W. J.**—Catagramma pitheas and C. cyclops distinct species. **8,** 1919, 5-6. **Knetzger, A.**—Hesperids rare at St. Louis, Mo. **17,** iii, 6. **Rothke, M.** Contributions to the life histories of Thyris lugubris, and T. maculata. **17,** iii, 4-5.

DIPTERA. Carter, A. E. J.—Note on the "singing" of Syrphus ribesii while at rest. **8,** 1919, 18. **Hadwen & Cameron.**—A contribution to the knowledge of the bot flies, Gastrophilus intestinalis, G. haemorrhoidalis, and nasalis. **22,** ix, 91-106. **Lamb, C. G.**—On a parasitic Drosophila from Trinidad. **22,** ix, 157-62. **Lodge, O. C.**—An examination of the sense reactions of flies. **22,** ix, 141-52. **Ludlow, C. S.**—Note on Limatus durhami. **5,** xxv, 127-8. **Marchand, W.**—First account of a thermotropism in Anopheles punctipennis, with bionomic observations. **5,** xxv, 130-35. **Mosier & Snyder**—Further notes on Tabanidae in the Florida everglades. **10,** xx, 182-84. **Ross, W. A.**—The identity of the wheat midge in Ontario. **4,** 1919, 16.

Brues, C. T.—New [7] No. Am. Phoridae of the genus Aphiochaeta. **15,** vi, 183-94. **Felt, E. P.**—A study of gall midges. VI. [many new]. **58,** No. 202, 76-205. **McAtee, W. L.**—Key to the nearctic species of the genus Laphria (Asilidae) [12 new]. **82,** xix, 143-70. **Townsend, C. H. T.**—New muscoid genera, species and synonymy. **15,** vi, 157-82.

COLEOPTERA. Barnes, P. T.—Fireflies flashing in unison. **68,** xlix, 72. **Champion, G. C.**—Notes on various species of the genus Chalchas. **8,** 1919, 1-3. **Fisher, W. S.**—Chrysobothris tranquebarica versus impressa. **10,** xx, 173-77.

HYMENOPTERA. Cockerell, T. D. A.—Some halictine bees in the U. S. National museum. **10,** xx, 177-82. **Gatenby, J. B.**—Note on Apanteles glomeratus, a braconid parasite of the larva of Pieris brassicae. **8,** 1919, 19-24 (cont.). **Weiss & Nicolay**—Notes on Closterocerus cinctipennis in New Jersey. **5,** xxv, 128-30.

Rohwer, S. A.—Notes on, and descriptions of sawflies belonging to the tenthredinid tribe Hemichroini [2 new]. **10,** xx, 161-73.

Doings of Societies.

Feldman Collecting Social.

No meeting was held in October owing to the epidemic of influenza.

Meeting of November 20, 1918, at the residence of Wm. S. Huntington, 1006 N. 64th St., Philadelphia; eleven members present; President H. W. Wenzel in the chair.

Coleoptera. Mr. Harbeck said a man in Trenton, New Jersey had complained to him of his war garden being ruined by a large "bug" coming from the ground at night in great numbers, and when he had examined specimens, found them to be *Lucanus dama* Thunb. Mr. Wenzel said there was no doubt but there was something in the garden to attract them, and they were not merely digging in the ground. Mr. H. A. Wenzel said they had found *mazama* LeC. in the west in early morning, running along the trails looking for a place to hide. Mr. H. W. Wenzel said that in July and August he had noticed great numbers of *Cotinus nitidus* Linn. and some weeks later, while cutting the grass, he had seen what he at first had mistaken for an ant hill. When this pile of dirt was pushed aside, quite a large hole was disclosed, and he then took a steel wire with a hook on one end which he inserted in the hole twelve or fourteen inches, and after turning a few times, drew out a large Scarabaeid larva. Many of these were found later. Some he was unable to hook and he came to the conclusion that these burrows had lateral galleries at the bottom. Dr. Castle exhibited a phial containing many larvae and pupae of *Popillia japonica* Newm. from Riverton, New Jersey. Mr. Laurent reported the capture at Mt. Airy, Philadelphia, Pa., of *Lebia tricolor* Say on October 5, *Tachinus limbatus* Melsh. on September 4, and the introduced species, *Sphaeridium 2-pustulatum* Fabr. on October 19.

Orthoptera. Mr. Laurent mentioned that for many years he had reported the large mantis, *Paratenodera sinensis* Sauss. as common, but this year, for the first time, it was scarce, though the nymphs were quite plentiful during June and July.

Diptera. Mr. Hornig stated that this year the first mosquito larvae were found March 27, and the last November 14.—Geo. M. Greene, *Secretary*.

OBITUARY

Benjamin Hayes Smith, a collector of Coleoptera, died at his residence, 4704 Chester Avenue, Philadelphia, on November 25, 1918. He was born in Upper Darby, Delaware County, Pennsylvania, May 7, 1841, son of Dr. George Smith and Mary (Lewis) Smith. Dr. Smith was a prominent physician and citizen of the county and was especially active in the Delaware

County Institute of Science at Media. He was a botanist of note and author of a list of plants of Delaware County which appeared in an important historical work, the *History of Delaware County,* of which he was also the author.

Benjamin H. Smith was educated at Haverford School, afterward Haverford College, where he graduated in 1859. The study of Natural History was strongly encouraged at the school, the collecting of insects being then the favorite pastime, and young Smith, who shared his father's interests, became intensely interested in forming a collection of Coleoptera, a pursuit which he followed for many years afterwards whenever opportunity offered. At the outbreak of the Rebellion he joined the Anderson Troop and served under General Buell throughout the campaign in Tennessee, Alabama and Mississippi, which was later conducted by General Rosecrans, the troop being attached to headquarters.

Smith's ambition had always been to locate in the far west and in 1869 he visited Denver, Colorado, returning in 1872 to take a position in the Surveyor General's office in the Mining Department. He had been married in 1866 to Miss Addie L. Brooke, of Delaware County, and his wife followed him to Colorado as soon as he had established himself and they resided there until 1876, returning again to occupy the same position from 1880 to 1887. His work took him to various parts of Colorado and offered splendid opportunities for the prosecution of his natural history pursuits. He collected beetles assiduously and sent back packages of plants to his father. During his later residence there, botany seemed to occupy his main attention and upon his return to Delaware County, in 1887, he devoted his leisure time almost exclusively to this study. He had visited California and Oregon in 1887, and in 1893 and 1894 spent most of the summer in New Mexico, while he engaged in many other trips to various parts of the east, combining his botanical interests and his love of trout fishing. He was a close friend of the late Dr. Thomas C. Porter and in later years Dr. C. S. Sargeant, with whom he made many trips. After his return to the east he was engaged as an investment broker.

He was a member of the Academy of Natural Sciences of Philadelphia, the American Entomological Society and the Philadelphia Botanical Club, as well as of many historical and literary societies. In the Entomological Society he served on the Committee on Coleoptera in 1879, on the Executive Committee in 1888 and on the Publication Committee from 1889 to 1913.

In spite of his great interest in Natural History, his publications seem to have been entirely upon historical subjects, most of them being contributions to the *Pennsylvania Magazine of History and Biography*, issued by the Historical Society of Pennsylvania.

Mr. Smith was a remarkably well read man, with a knowledge of a variety of subjects, but modest and retiring, so that few realized his attainments. In science he was one of those who find greater satisfaction supplying valuable material and information for the use of others than to engage in original publication.—WITMER STONE.

In August, 1918, he presented his collection of Coleoptera, neatly labeled and arranged in ninety boxes, of a modified Schmitt type, to the Zoological Laboratory of the University of Pennsylvania, where it has been installed in Brock cases. According to a memorandum in the copy of Henshaw's *List* which, marked for the species represented, served as a catalogue of his collection, he had about 10,000 specimens of 2333 species, very largely from Delaware County, Pennsylvania, and from Colorado, but from other States as well. Many of the locality labels (and this applies to the Colorado specimens) give the State name only. At the time when he made this gift, he recalled his personal association with Doctors Le Conte and Horn in the early decades of the Entomological Society, and that failing eyesight caused him to turn his studies from beetles to plants. He left a number of drawings of details of Rhynchophora which his daughter, Miss Alice L. Smith, has placed in the writer's custody; it may be that they can be utilized as illustrations for some future publication on the group.—PHILIP P. CALVERT.

EXCHANGES.

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Catocalae—For exchange; perfect specimens of *Faustina* var. *zillah, similis, gracilis.* Desire other *Catocalae.*—Ernest Baylis, 5011 Saul Street, Phila., Pa.

Wanted to Exchange—I wish to exchange Actias luna cocoons for Lepidoptera. Carl Selinger, 4419 Dover St., Chicago, Ill.

Will pay cash for Pars 39 and 52: Coleopterorum Catalogus, of Junk. Jos. O. Beaulne, 3653 Notre Dame East. Montreal, Canada.

Wanted—Living and preserved material of Tabanid and other dipterous larvae and pupae. Tabanid larvae obtained by sifting soil at edge of ponds and streams. Packing in wet material, not water, each larva separate, in glass vials or tins. To preserve use boiling water, then alcohol. Exchange: Insects of all orders, or cash. Werner Marchand, 10 Dickinson St., Princeton, N. J.

Live Pupae of Sph. chersis, drupiferarum, luscitiosa, eremitus, Phil. achemon, Deid. inscripta, Paon. excaecatus, myops, Eac. imperialis, Cres. juglandis and others for exchange. Wanted—N. A. and Exotic Lepidoptera. Will pay cash for N. A. Catocalas. Herman J. Erb, 925 Hatch Ave., Woodhaven, Lg. Isl., New York.

Wanted for Cash or Exchange—Exotic Lycaenidae and some species from the U. S. Send me your offerta and lowest cash price. Paul N. Musgrave, 130 Oak Street, Clarksburg, W. Va.

Wanted—Syrphidae, Bombylidae and Coccinellidae from all parts of the world in exchange; also Florida insects for those from other regions. P. W. Fattig, Box 315, Gainesville, Fla.

Wanted—Phanaeus, Moneilema and Cleridae for cash or liberal exchange in rarities. Please send your lists to F. J. Psota, 316 So. Mozart St., Chicago.

Diurnal Lepidoptera—I have many desirable western species to exchange. Send lists of offerta. Dr. John Comstock, Southwest Museum, Marmion Way and Ave. 46, Los Angeles, Calif.

Certain Odonata Wanted.—The undersigned desires to examine Gomphus dilatatus and Enallagma pollutum from Florida and nearby States and will much appreciate a loan of such specimens. Please write before sending.—Philip P. Calvert, Zoological Lab'y., University of Pa., Philadelphia, Pa.

Wanted—Species of Dytiscidae, Haliplidae, Gyrinidae and Hydrophilidae, either for exchange or cash. Please send lists. Dr. Geo. W. Bock, 2904 Allen Ave., St. Louis, Mo.

Pentatomidae.—Would like to purchase North American material in this family of Hemiptera. G. Chagnon, P. O. Box 521, Montreal, Canada.

Wanted for Cash—Synopsis of the Erotylidae, by G. R. Crotch, Wm. Beutenmuller, 879 Whitlock Avenue, Bronx, New York, N. Y.

Wanted—Specimens of fleshy and woody fungi from which beetles have been collected, together with names of host trees, names of beetles, localities and dates. All specimens will be gratefully acknowledged and identified, and the information properly accredited. Harry B. Weiss, State Department of Agriculture, Trenton, N. J.

Wanted—Tipulidae from all parts of North America. Material from the far North especially desired. Will buy or exchange. Dr. W. G. Dietz, 21 North Vine Street, Hazleton, Pa.

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2108.—**Malloch** (J. R.).—On an undescribed species of Medeterus. (Ent. News, **30**, 7-9, 1919) ..... .10

HEMIPTERA.

2107.—**Wilson** (H. F.).—Three new Lachnids, with comparative notes on three others. (Ent. News, **30**, 1-7, 2 pls., 1919) ..... .20

HYMENOPTERA.

2110.—**Cockerell** (T. D. A.).—A new genus of bees from Peru. (Ent. News, **30**, 17-18, 1919) ..... .10

2116.—**Cockerell** (T. D. A.).—Neocorynura, a new genus of Halictine bees. (Ent. News, **30**, 41-42, 1919)..... .10

LEPIDOPTERA.

2109.—**Schwarz** (E.).—On the early stages of Catocala titania, and a description of three new varieties of Catocala. (Ent. News, **30**, 14-17, 1919) ..... .10

ODONATA.

M-3.—**Munz** (P. A.).—A venational study of the suborder Zygoptera, with keys for the identification of genera. (Mem. **3**, 78 pp., 20 pls., 1919)..... 1.50

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SOLD

I have sold my 1918 stock of Catocala ova to Mr. T. D. Mayfield, 50 Columbia Street, Newark, New Jersey.

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R. F. D. No. 1 Box 274, Provo, Utah.

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